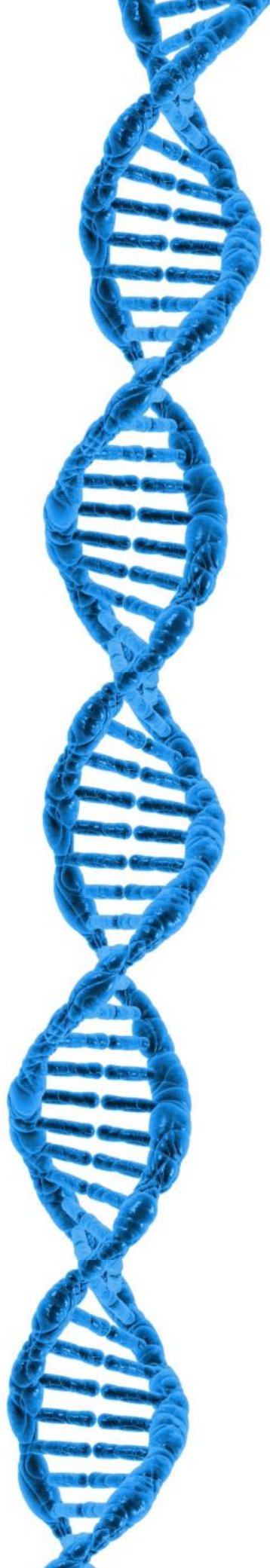




Breaking down the barriers: How should we communicate SynBio to the public?

By Newcastle University iGEM Team





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Introduction

“The limits of my language mean the limits of my world” – Ludwig Wittgenstein

The main purpose in science communication should be to convey information in a clear and accurate way, enabling the largest possible audience to access and engage with the work.

As the 2017 Newcastle University iGEM team, part of our work has involved investigating science communication. This research has included...

- ❑ **A corpus based investigation** to understand how the media currently tackles synthetic biology and related topics
- ❑ **Conversations with students and teachers** to see how they engage with science both inside and outside of the classroom
- ❑ **Reading previous research and public dialogue activities**
- ❑ **Engaging with language research and analysis methods** from the field of linguistics

As the culmination of this research, we have produced *Breaking down the barriers: How should we communicate SynBio to the public?* - a set of advisory guidelines to aid with the thinking, planning and execution of science communication.





The Starting Point: Establishing Structure

Starting with a clear structure before going into closer detail helps ensure clear communication.

Before starting to communicate work, ask and answer three key questions:

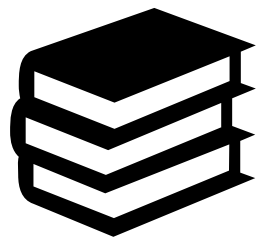
- 1) **What** format am I using to write?
- 2) **Who** am I writing for?
- 3) **Why** am I writing?

Avoid a **GAP** in communication... think **Genre, Audience, Purpose**.

This helps establish the foundations for constructing your work. Based on the answers to these questions, language use can be adapted accordingly.

Consider the story within your work- what will the audience who read it want to discover?

The way you communicate your work should answer some fundamental questions, in a logical order: Who did it? What did they do? Why does it matter?



Genre and Conventions

Depending on which genre is being used to communicate your work, the methods which you use will also differ accordingly. How the methods differ depend on the conventions of the genre you use.

Conventions: defining formal text features which are characteristic to a genre

In order to communicate effectively in your chosen genre, take some time to consider its conventions.

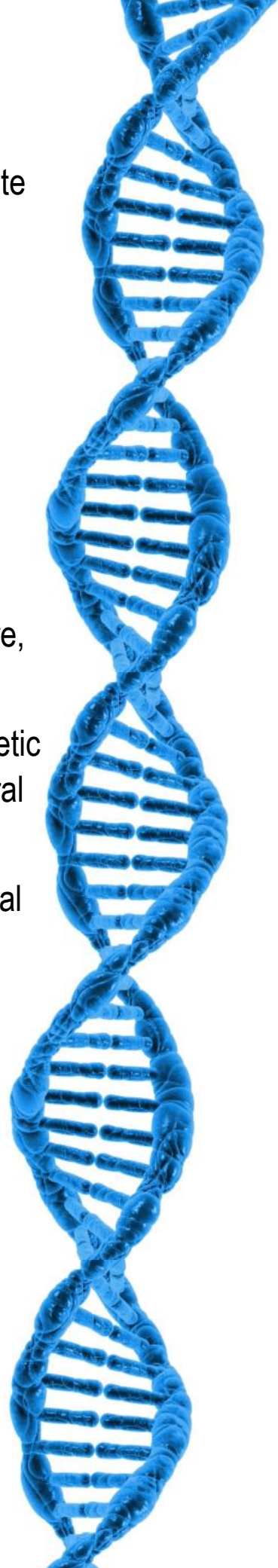
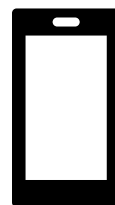
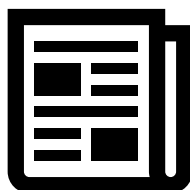
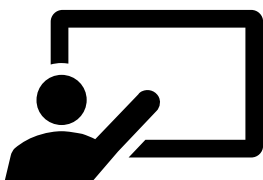
Examples of some genres the public may access synthetic biology via, and a selection of some of their more general conventions, include...

Academic lectures → evidence and citations; technical vocabulary

Academic articles → abstract to summarise material; numbered subsections; formal style

News and media articles → attention grabbing headline; shorter paragraphs

Social media posts → informal, conversational style; condensed information





Audience and Jargon



Jargon: Subject Specific Language

(Shortland and Gregory, 1991)

When writing for the general public, it is important not to make assumptions about the knowledge level of the audience.

In the use of jargon, a balance must be achieved.

Jargon can be overwhelming and intimidating. If an audience does not understand words in the information they are provided with, it becomes a lot less accessible. The distance between the work and the audience is increased.

Therefore, do not overload with jargon, or use it for the purpose of elevating to an 'expert' status.

On the other hand, use of jargon can be helpful to ensure the work is not misrepresentative or inaccurate, due to not using correct terms.



If using jargon, also offer a definition. Let readers know what any abbreviations stand for at their first use.

A glossary could be used to collect terms used throughout the text in an easy to access fashion.

Purpose and Delivering a Message

Three of the main purposes a text which communicates science can have are ...

To inform → educate the public about topics, allow new information to be received

To entertain → ensure the audience stay engaged throughout, and that they are more likely to take in the information which is being supplied

To persuade → convince the public that they should be interested in a topic, and that they should care about it

Deliver your message in a clear fashion to ensure your audience understand the information which you are conveying. Avoid using long sentences and overly elaborate vocabulary.

Assessing attitudes towards the subject of the text which you are communicating also helps achieve purpose. This means you can acknowledge any pre-existing attitudes, both positive and negative, to understand how they may affect the reception of your work.

Multimodal Interaction

Presenting your information in varying ways is a good way to engage the public throughout, enabling you to inform, entertain, and persuade with your communication.





Transparency and Ambiguity

One of the most important things which members of the public desire in science communication is transparency.

Below, certain linguistic features have been highlighted. They have been considered in relation to transparency in communication. These features often relate to minimising ambiguity and vagueness in language use, which in turn contributes to transparency.

Hedging

Hedges are a linguistic feature which, when used in speech and writing, lessens the impact of the message that is being delivered (Wood and Kroger, 2000).

Hedging increases the effect that your language is vague or tentative.

Examples include: *possibly, probably, potentially*

Deictic Expressions

Deictic expressions are used to refer to something which is associated with the subject of the text.

Examples are... *this, that, it*

Deictic expressions can increase ambiguity and vagueness in a text. For example, *it* could have multiple possible referents (Wood and Kroger, 2000).

To increase clarity, when deictic expressions are used, be certain and explanatory of what the referents are.

Modals

Modal auxiliaries are verbs which indicate likelihood (Wood and Kroger, 2000).

Examples include... *can, may, will, shall*

Which modal you choose can indicate the degree to which something is likely, and hence affects the level of certainty expressed in the text- for example, *should* indicates something is more likely than *may*.

Semantic Prosody

Semantic prosody describes how certain words, which themselves may be inherently neutral, gain positive or negative associations due to the words which they frequently occur with (Ahmadian *et al*, 2011).

Choosing a word with positive or negative semantic prosody can affect the tone of your work.

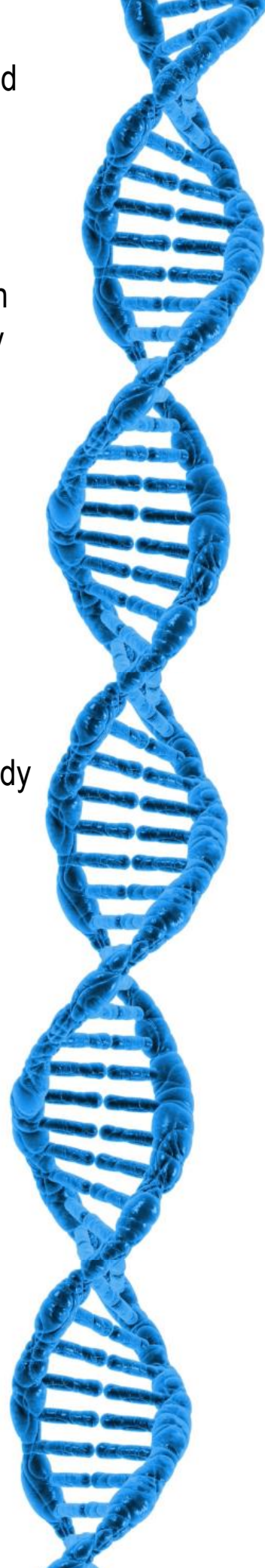
For example the verb *cause* carries negative semantic prosody, as it frequently occurs with words like *death* or *disease*. Consider this in comparison to the more positive prosody of a largely synonymous verb, like *produce*.

Discourse Markers

Discourse markers can be used to direct the discourse, and move your discussion clearly from one subject to the next.

Use discourse markers to structure the message, and keep an audience engaged.

Examples include ... *however, furthermore, in addition*





Conclusion

Effective science communication is vitally important to ensure the public can understand, engage, and be involved with synthetic biology. Communication is of particular importance for the emerging field of synthetic biology, with many members of the public unaware what synthetic biology is, and how it can help the world.

As work continues in synthetic biology, work should also continue in communication and engagement. This will help synthetic biology reach and help the largest possible audience!

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